Joint DESY and University of Hamburg Accelerator Physics Seminar

Friday, November 04, 2005

(14:30 in Room 459/30b)

Dynamics of Electron Beam and Dark Current in Photocathode RF Guns

(Disputation)

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Abstract

The emission processes of electron beams from Cs_2Te photocathodes have been experimentally studied at the photoinjector test facility at Zeuthen (PITZ) and the results have been compared with simulations. Low charge electron beams have been generated in order to minimize the space charge influence. Drive–laser pulses with a short length have been used to generate the bunches in order to maximize the emission phase sensitivity. As a function of emission phase and rf gradient, the Schottky effect, the thermal emittance variation, and the secondary electron emission processes have been investigated. The results for the low charge beams have been extended to analyze the beam dynamics for typical operating conditions of PITZ. Characteristic field emission sources for dark current and its dynamics with respect to the rf gradients and the solenoid field configurations have been studied. Electron multipacting occurring at the photocathode has been measured systematically and the multiplication process has been numerically modeled. Finally, the thermal emittance of the beam, dark current and multipacting for the X–ray free electron laser (XFEL) gun have been estimated.

NOTE THE UNUSUAL DATE AND TIME

D.P.Barber (MPY), J.Rossbach (Univ. HH) and M.Vogt (MPY).